Serum B₂ M Level in High Risk Groups of AIDS:
A Preliminary Study

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Abstract
β₂ microglobulin (β₂ M) level has been suggested to be used as a screening tool for AIDS patients. In this preliminary study, high risk populations of AIDS were studied for β₂ M by ELISA. Blood were collected from 42 healthy homosexual males, 20 intravenous drug abusers, 10 female prostitutes, 10 men with sexually transmitted diseases and 30 blood donors. The mean of normal value in this study was 1.28 ± 0.64 mg/l. Sixty five per cent of drug abusers showed elevated serum β₂ M while the other groups were within normal range. The sera from 17 patients with liver cancer which included in this study showed high serum β₂ M level.

INTRODUCTION
Acquired Immune Deficiency Syndrome (AIDS) is a newly described disease. The high risk groups in USA are sexually active homosexual men, intravenous (IV) drug abusers, Haitians and hemophiliacs. Diagnosis of this disease is facilitated by the clinical manifestation and laboratory findings. Antibody for HTLV III/LAV, which has emerged as the likely etiologic agent of AIDS, could be used for epidemiologic studies and screening of the disease in defined populations. Serum β₂ microglobulin (β₂ M) is one of the other assays which may provide yet another diagnostic marker for AIDS patients, AIDS related complex (ARC) and high risk populations.

Human β₂ M is a low molecular weight protein (MW = 11,800) consisting of a single polypeptide chain of 100 amino acid. This protein may play an important role in the immune function of the body because of its association with histocompatibility antigens and its amino sequence closely resembles that of the constant part of the immunoglobulin chain. The serum β₂ M is determined by glomerular filtration and the rate of synthesis. Abnormally high levels of β₂ M have been reported in a variety of diseases, including a number of B-cell malignancies, autoimmune diseases, diseases associated with chronic inflammation and acute viral infections.

The first case of AIDS was reported in Thailand in 1984 and up to now at least 5 cases were reported. In the present preliminary study, we have determined serum β₂ M in various high risk groups of AIDS compared to healthy blood donors.
MATERIALS AND METHODS

Blood were collected from 42 healthy homosexual males, 20 IV drug abuser males, 10 female prostitutes; 10 men who had various sexually transmitted diseases and 30 healthy blood donors. Seventeen sera from patients with liver cancer were also undertaken. Serum \( \beta_2 \) M was measured by a commercial ELISA test kits provided by the Behring Institute, Germany.

The test was a competition enzyme immunoassay. \( \beta_2 \) M in the serum competed with a fixed amount of enzyme labelled \( \beta_2 \) M for the binding sites of anti \( \beta_2 \) M antibodies bound to plastic tubes. Unbound constituents were washed out, stopped the reaction and the bound enzyme activity was measured by a photometer. The concentration of \( \beta_2 \) M was inversely proportion to the color intensity reading photometrically. The \( \beta_2 \) M concentration in the sample was read from the reference standard curve.

RESULT

In this study, the levels of serum \( \beta_2 \) M in homosexual, drug abusers, female prostitutes, males with sexually transmitted disease (STD), liver cancer patients and blood donors were compared. The results were as summarized in Table 1.

Serum samples from 30 healthy donors were analysed to determine the range of normal values. The mean ± SD and median ELISA in the control group were 1.28 ± 0.64 and 1.13 mg/l, respectively. Since the upper range of serum \( \beta_2 \) M in these healthy control was 2.55 mg/l (\( \bar{X} + 2\sigma \)), any serum \( \beta_2 \) M value that exceeded 2.55 mg/l was defined as high level for this assay. Serum \( \beta_2 \) M level showed a tendency to decrease with increasing age. (Figure 1)

In the high risk groups of AIDS, 65% (13 out of 20) of drug abuser males showed high serum \( \beta_2 \) M while 42 sera from healthy homosexual males were within normal limit. The mean ± SD value and median of these homosexual were 1.53 ± 0.75 and 1.35 mg/l, respectively, but in the drug abuser males were 3.39 ± 1.76 and 3.08 mg/l.

Analysis of serum \( \beta_2 \) M from female prostitutes and males with STD showed that \( \beta_2 \) M levels were within normal range. A total of these 9 STD males, excluding a 20 year male who had serum \( \beta_2 \) M 14.28 mg/l, had mean ± SD and median 1.99 ± 0.47 and 1.98 mg/l, and in 10 female prostitutes were 1.52 ± 0.29 and 1.63 mg/l, respectively.

Sera from 10 patients with liver cancer were also included in this study. It was found that all of them had increased in serum \( \beta_2 \) M with mean ± SD and median 5.27 ± 2.45 and 5.14 mg/l, respectively.

DISCUSSION

The levels of serum \( \beta_2 \) M measured by ELISA in various groups were compared. The value of serum \( \beta_2 \) M in 30 healthy blood donors, served as control, was 1.28 ± 0.64 mg/l. So the upper limit of normal value is 2.55 mg/l (\( \bar{X} + 2\sigma \)). The normal level is in accordance with the findings from the other studies. Previously published, the average normal values of serum \( \beta_2 \) M determined by single radial immunodiffusion, radioimmunoassay, and ELISA were 1.80 mg/l, 1.60 mg/l and 1.58 mg/l, respectively. We found that the serum \( \beta_2 \) M level seems to decrease with age, but the number of the subjects was quite small. An asymptomatic 53 year male blood donor had high serum \( \beta_2 \) M at level of 3.90 mg/l. His serum also had high complement fixing antibody to cytomegalovirus at titer of 64 (Kositanont U, personnel communication). So this abnormal high \( \beta_2 \) M might reflect some asymptomatic infection.

In high risk groups of AIDS, 65% of drug abusers showed elevated serum \( \beta_2 \) M while the homosexual had normal value. In previous studies, high serum \( \beta_2 \) M levels were observed in healthy homosexual, AIDS and AIDS related complex (ARC) patients. Some high serum \( \beta_2 \) M in healthy homo-
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No correlation between serum $\beta_2$ M and $\alpha$-fetoprotein in those patients were observed in this study (Chainuvati T & Ksonlamp J, personnel communication).

The use of serum $\beta_2$ M test as a screening test of high risk groups may not be necessary in low incidence of AIDS area. Since the elevated serum $\beta_2$ M level can be found in a variety of diseases, including AIDS and suspected AIDS. So, this non-specific test appears to be a useful tool when combined with other specific laboratory tests for AIDS and other agents.

**REFERENCES**